

REMARKS

In view of the above amendments and following remarks, reconsideration of the rejections contained in the Office Action of November 16, 2005 is respectfully requested.

In the Office Action, the Examiner rejected claims 3, 6, 8, 11-12 and 15-16 as being unpatentable over Miyashita '583 in view of Miyashita '639. Further, beginning in section 3 on page 4 of the Office Action, claims 1, 2, 5, 7, 9-10 and 13-14 were rejected as being unpatentable over the two Miyashita patents and in further view of Hayashi et al. '230. However, it is respectfully submitted that the present invention, especially as now represented by the above amended claims, clearly distinguishes over both Miyashita patents and the Hayashi patent.

It is initially noted that the Examiner rejected claim 3 based upon the combination of the two Miyashita patents by themselves, but combined these patents with Hayashi to reject claim 1. Claim 3 depends from claim 1, however. It is generally assumed that the Examiner intended to include claim 1 in the initial rejection based upon the two Miyashita patents by themselves. However, as the above amendments clearly distinguish over all of the references, no matter how they might be combined, this issue is in any case moot.

It is noted that all of the references now cited by the Examiner were discussed in the response filed September 19, 2005, such response distinguishing the claims over these references. Further amendments to the claims have been made above. However, such amendments should not be taken as any acquiescence in the positions taken by the Examiner with respect to the applicability of the references to the claims in their prior form.

Each of independent claims 1, 6, 7 and 8 recites a polishing section or polishing surfaces, a cleaning section and a measuring device for monitoring the pH or ion concentration of electrolyzed water. Further, the cleaning section in each of the independent claims is recited as for cleaning at least a polished surface of the substrate which has been polished. The cleaning section has an electrolyzed water supply device for supplying electrolyzed water to the polished surface of the substrate to form a metal-oxide film on the polished surface of the substrate. Each cleaning section of each of the independent claims also recites a diluted hydrofluoric acid supply device for supplying diluted hydrofluoric acid to the polished surface of the substrate to dissolve the metal-oxide film that

is formed on the polished surface of the substrate and remove the metal-oxide film from the polished surface of the substrate.

As discussed in paragraph 7, after a layer such as a copper layer has been polished in a CMP process, it has a high activity and is thus liable to be oxidized. If the wafer is left as it is, the oxide film is formed by natural oxidation, which tends to be formed irregularly or non-uniformly, because there is no control of the formation of the film.

Noting Fig. 4, the present invention provides electrolyzed water supply nozzles 25a, 25b supplying anode electrolyzed water to the semiconductor wafer. Further, the present invention provides diluted hydrofluoric acid (DHF) supply nozzles 26a and 26b for supplying DHF to the semiconductor wafer. At least one of each of the nozzles forms an electrolyzed water supply device and a DHF supply device, respectively.

As discussed in section 37, the purpose of supplying the electrolyzed water to the surface of the substrate is to form the metal-oxide film on the surface of the substrate. The purpose of supplying the DHF to the surface of the substrate is to dissolve the metal-oxide film and to remove the film. By supplying electrolyzed water or DHF at desirable places in the polishing apparatus and/or a desirable timing according to its purpose, a substrate having a uniform and good oxide film in quality can be obtained.

As described in section 46 of the specification, primary polishing may be conducted to remove the copper layer with the barrier layer being used for a stopper. In this case it is necessary to detect the exposure of the barrier layer on the substrate during polishing. This detection can be conducted by using a sensor, as further discussed in section 46. A transfer robot transfers the substrate from the polishing section to the cleaning section after exposure of the barrier layer on the substrate is detected by the sensor.

Each of independent claims 1, 6, 7 and 8 now recites a sensor for detecting exposure of a barrier layer in the substrate during polishing. Further, each of these claims also recites a transfer robot for transferring the substrate from the polishing section to the cleaning section after exposure of the barrier layer on the substrate is detected by the sensor.

Neither Miyashita patent discloses or suggests a sensor for detecting exposure of the barrier layer on the substrate during polishing, or a transfer robot for transferring the substrate from the polishing section to the cleaning section after the exposure of the barrier layer is detected by the sensor.

With the present invention, the substrate can be transferred from the polishing section to the cleaning section, and be cleaned therein with the electrolyzed water and diluted hydrofluoric acid, immediately after exposure of the barrier layer on the substrate is detected by the sensor. As a result, the substrate can have a high-quality surface. These features and advantages of the present invention are not disclosed or suggested by the content of either Miyashita patent. There is simply no reference to any such features in either patent.

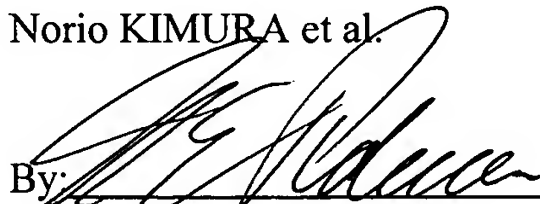
The further cited reference to Hayashi also fails to cure these deficiencies of the Miyashita patents.

Accordingly, it may be seen that all of the claims now pending in the present application distinguish over all of the references that have been cited by the Examiner. Indication of such is respectfully requested.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance, and the Examiner is requested to pass the case to issue. If the Examiner should have any comments or suggestions to help speed the prosecution of this application, the Examiner is requested to contact Applicants' undersigned representative.

Respectfully submitted,

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February 16, 2006